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News Release

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For immediate release

Argonne chemist wins AWIS Innovator Award for nanoparticle research

ARGONNE, Ill. (July 17, 2009) — The Chicago chapter of the Association for Women in Science (AWIS) granted its third annual Innovator Award to Tijana Rajh, group leader of the Nanobio Interfaces research group at Argonne National Laboratory's Center for Nanoscale Materials. The award honors contributions to science in the Chicagoland area. Rajh received the award for her work studying semiconductor nanoparticles, a field with applications from solar power to cancer research.

Rajh cites Marion Thurnauer, a longtime Argonne scientist and former director of the Chemistry Division, as her mentor. "At the time she was hired at Argonne, and for the next eight years, she was the only female Ph.D. staff member of Argonne's Chemistry Division," Rajh said. "That experience prompted her to encourage broader searches for women to be represented in the Argonne job candidate pool."

Rajh herself grew up in Yugoslavia, where, she says, it was more common for women to have careers in science. A friend of her mother's brought Rajh to visit her workplace, a scientific institution much like Argonne. "I fell in love with it," Rajh said. "There was absolutely no question what I was going to do with my life. And then when I came here," she added, smiling, "I was hooked."

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Tijana Rajh – add one

While finishing her undergraduate physical chemistry degree at the University of Belgrade, a professor invited her to join a research project attempting to split water into hydrogen and oxygen molecules for fuel purposes. She didn't know it, but it was the jumping-off point for a long career studying semiconductor nanoparticles — tiny particles made from materials which form the heart of modern electronics. Their photoactivity and stability is exactly what makes them good for many uses, from pollutant cleanup to medical imaging.

Rajh and the research team noticed that the particles of the same chemical composition appeared in different colors as researchers shrunk them smaller and smaller. Nanoparticles can change color, and other characteristics, with size: a quirk useful for many applications. "When you see it for the first time, it's so amazing," Rajh said. Together with her advisor Olga Micic and collaborator Art Nozik at the National Renewable Energy Laboratory, she authored one of the first three papers ever written about colloidal quantum dots (1985).

Thurnauer recruited Rajh in 1994, where she began studying how to use nanoparticles in a variety of applications: to remove heavy metal pollutants from the environment, write data to nanocircuits in computers, and link nanoparticles with biological materials.

For example, Rajh works with particles made of the semiconductor titanium dioxide (TiO_2), which is white. When combined with organic compounds such as vitamin C or dopamine, which are also white, nanoparticles turn a brilliant red — indicating that the two materials are interacting at the molecular level. This discovery allowed her and her team to electronically link TiO_2 particles with DNA and other biological molecules, opening a whole new dimension of possibilities. One of the team members, Elena Rozhkova, is working to apply the particles to cancer treatment. "She marks glioma cancer cells with TiO_2 particles," Rajh explained, "and doctors could use light of a certain energy to destroy only those marked cells, leaving healthy brain cells intact."

At the core, though, Rajh loves basic science the best. "I love research, it's so cool," she said. "It's like a puzzle. There's a problem, and you look at it and start making connections, and very slowly the whole picture opens up."

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Tijana Rajh – add two

Rajh received her Ph.D. in 1986 from the University of Belgrade in Yugoslavia. Prior to working at CNM, she joined Argonne's Chemistry Division in 1996 and has been a prolific researcher, co-authoring six papers in 2008 alone.

She is the third scientist to be recognized by the Association for Women in Science Chicago Area Chapter, a nonprofit organization dedicated to advancing women in the field of science. The group formed in 1971 and has since expanded nationwide. Chapters advocate for women in all scientific fields, publicize women's achievements, and hold educational workshops for students. The Innovator Award recognizes achievements in science in the Chicagoland area.

The CNM at Argonne is one of the five DOE Nanoscale Science Research Centers (NSRCs), premier national user facilities for interdisciplinary research at the nanoscale. Together the NSRCs comprise a suite of complementary facilities that provide researchers with state-of-the-art capabilities to fabricate, process, characterize and model nanoscale materials, and constitute the largest infrastructure investment of the National Nanotechnology Initiative. The NSRCs are located at DOE's Argonne, Brookhaven, Lawrence Berkeley, Oak Ridge and Sandia and Los Alamos National Laboratories. For more information about the DOE NSRCs, please visit http://nano.energy.gov.

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